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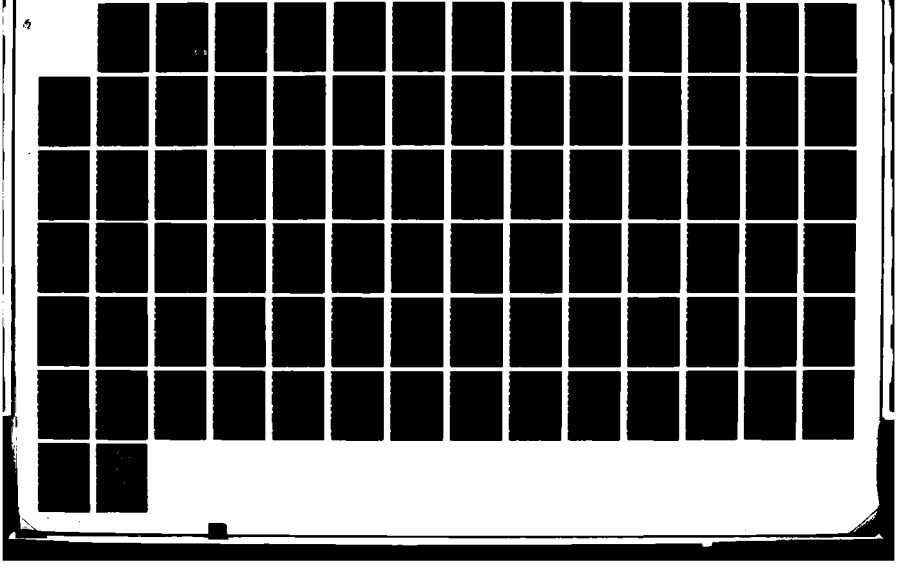

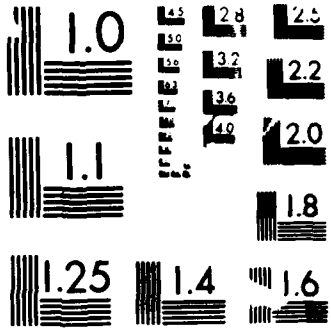

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PERCEPTIONS OF PROFESSIONAL REGISTRATIO AMONG AIR FORCE CIVIL ENGINEERING OFFICERS

THESIS

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Captain, USAF

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AFIT/GEM/DEM/87S-10

PERCEPTIONS OF PROFESSIONAL REGISTRATION AMONG AIR FORCE CIVIL ENGINEERING OFFICERS

THESIS

Presented to the Faculty of the School of Logistics
of the Air Force Institute of Technology
Air University
In Partial Fulfillment of the
Requirements for the Degree of
Master of Sciences in Engineering Management

Gerald L. Hromowyk
Captain, USAF

September 1987

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Gerald L. Hromowyk

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Abstract

The purpose of this research was to determine why only a small percentage of Air Force Civil Engineering officers are professionally registered. The study had three objectives: (1) determine the attitudes and perceptions of Air Force Civil Engineering officers towards professional registration, (2) determine what causes these perceptions, and (3) if negative, what can be done to change these perceptions.

The study was accomplished by a statistical analysis on the results from a mailed questionnaire to Air Force Civil Engineering officers. The officers ranked from Second Lieutenant to Lieutenant Colonel and were in 55XX career field. The results show Air Force Civil Engineering officers do not perceive a need for professional registration or are undecided about the need for it. This perception didn't vary with officer rank. Therefore, Air Force leadership needs to offer incentives or make registration mandatory if they want more engineers registered.

The primary reason for wanting to obtain professional registration was "personal goal". The respondents perceived no incentive nor encouragement to become registered. The primary reason for not becoming registered was "the Air Force doesn't require it". Respondents believed registration had little effect on their career since many officers on the promotion board were unaware of the professional registration

process and its' professional significance. Recommendations include promotion boards being briefed about the significance of registration prior to their selections. And a special block for registration should be included in the officers promotion brief.

The preferred study method in preparing for the Engineer Intern Exam, Principles and Practices of Engineering Exam, and Architectural Registration Exam was "to study alone" and use "study guides/manuals". In addition, the preferred Air Force provided study method was a short course offered by the Air Force Institute of Technology (AFIT), School of Civil Engineering and Services. The recommendation was for the Air Force to either provide a short course by AFIT or offer financial assistance for those seeking registration.

PERCEPTIONS OF PROFESSIONAL REGISTRATION AMONG AIR FORCE CIVIL ENGINEERING OFFICERS

I. Introduction

General Issue

Engineers can become licensed professional engineers by passing a two-part written national examination. The first part is the Engineering-Intern-Test (E.I.T.). The second part, which can be taken after four years of qualifying experience, is the Principles and Practices of Engineering (P.E.) exam. If both parts are passed, the engineer receives a license to practice in that state. In the civilian community, obtaining a license is a key step towards promotion. Some Architect-Engineer (A-E) firms will not hire an engineer unless he has passed the E.I.T. Also, the engineer will not be given responsibility for any projects unless he has a license.

This is not the case for Air Force civil engineering officers. Their only requirement is to have a college degree in engineering. Thus, there is little incentive to complete even the E.I.T. Civil engineering officers are told throughout their careers that Professional Military Education (PME) comes first. In other words, they are officers first and engineers second.

However, it is important for the military engineer to become professionally registered. The reasons include: increased credibility with architect-engineer firms, increased credibility with construction firms, increased credibility within the Air Force community, and personal goals.

> Lt Gen E.R. Heiberg III, Chief of the Army Corps of Engineers, Maj Gen George E.Ellis, Director of Engineering and Services, USAF, and Rear Adm John Paul Jones Jr., Chief of Civil Engineering, NAVFAC all actively support registration and encourage all unregistered engineers to complete the registration process (18:593).

The Air Force community depends on the military engineering officer for repairing, maintaining, and constructing facilities, as well as ensuring the reliability and safety of these facilities. This responsibility highlights the importance of professional registration.

Specific Problem

Only a small percentage of Air Force Civil Engineerings officers are professionally registered. This is a problem because the engineers will not gain credibility nor will they develop professionally.

Research Objectives

The research objectives include: (1) determining the attitudes and perceptions of Air Force engineers towards Professional Registration, (2) determine what causes these perceptions, and (3) if negative, what can be done to change these perceptions.

Research Hypotheses:

1. Air Force Civil Engineering officers do not perceive a need to become professionally registered.

2. The attitude towards professional registration does not vary with officer grade.

3. The reasons for wanting to become registered are independent of each other.

4. There aren't any differences in the reasons for not wanting to become registered.

5. There isn't a preference in study method in preparing for the registration exams.

6. Air Force Civil Engineers who are registered perceive registration helps them in their job.

7. Air Force Civil Engineers who aren't registered perceive registration would help them in their job.

Definitions

For the purpose of this research paper the following definitions apply.

1. Air Force Civil Engineers - Civil Engineering in the Air Force refers to the organization responsible for maintaining and repairing all base facilities. Personnel include both civilian and military engineers from all disciplines (i.e. mechanical, electrical, architectural, civil, etc...). For the purposes of this paper, only Air Force military engineering officers currently on active duty are included. They all have an Air Force Specialty Code of 55XX.

2. Professional registration - "A legal recognition by a state, the District of Columbia, or other jurisdiction of your qualifications to practice engineering" (9:1).

Summary

Chapter I introduced the subject of this research effort. The specific problem was stated, objectives of the study were presented, and definitions were given. The next chapter is a literature review of the subject.

II. Literature Review

The Need For Registration

Registration as a professional engineer establishes an accepted standard of technical excellence within the engineering profession. "Registration also provides a tangible method of qualifying an individual's level of expertise and as and as a professional within the military structure" (12:13). According to Mr. Eckard, "Not all engineers need to be registered, but those requiring it are carrying personal responsibility, and authority for projects involving public safety" (9:1).

> The U.S. Air Force Civilian Management Center, Randolph Air Force Base, Texas, announced that as of 1 October, 1986, registration will be required in filling over 300 key Engineering and Services Civilian Career Management Program positions that meet the U.S. Office of Personnel Management's X-118 Qualification Standards for requiring professional registration. These are positions that involve responsibility for final approval of designs of major structures and facilities involving public safety, and positions that involve responsibility for engineering determinations concerning contract awards or other major aspects of design and construction work to be performed by engineers in the private sector (1:3).

Even though military engineers are exempt from having to register, this does not mean they are exempt from the responsibility of public safety. Eventually, the Air Force may have the same requirements for military engineers as the Air Force Civilian Management Center has for the civilian engineer. The Air Force community looks to the military engineer for quality products and service.

> Maj Gen Clifton Wright, former Director of engineering and Services, USAF said, "I view professional registration and participation in professional societies as steps necessary to obtain full professional stability and to achieve recognition the military engineer deserves. This in turn projects a professional image to those we serve and support" (6:2).

In the Air Force, approximately 38% of all engineering officers have completed either the E.I.T., have already passed some or all sections of the Architect Registration Exam (A.R.E.), or are already registered (6:55). The 38% was calculated from the Air Force Directory of Registration. Only officers who knew about the directory and wanted their name included, were used in the calculations.. Thus, the 38% figure is probably a conservative figure. In contrast, approximately 73% of the Navy engineering officers have done so. An approximate percentage for Army engineering officers could not be determined because it takes a couple of years to get their records updated (4).

According to Capt Parke Smith, from the Air Force Military Personnel Center, "Engineers should seek to get registered as early as possible in their careers. This helps to improve their professional competence. However, it really doesn't help you get promoted. In addition, there aren't any jobs in the career field that require a Professional Engineers license" (17).

In contrast to this, Lt Eric Smith, from the Naval Military Personnel Command stated, "We tell our young engineers Professional Registration is very important to their

careers. In fact, an officer may not be promoted to O-4 if he is not registered. And he can all but forget about promotion to flag officer without registration "(16).

By going through the registration process, an engineer gains two important benefits: (1) he receives authority to practice engineering before the public, and (2) he establishes his professional standing on the basis of legal requirements. "Because registration is a legally recognized testimony of competence, it protects the engineer and it protects anyone who uses his service" (5:40). In fact, only registered engineers can testify as engineering expert witnesses. Therefore, becoming registered is not only desirable because it shows the competence of the individual engineer, but it projects a professional image to the public.

The next section looks at the steps necessary to become professionally registered.

The Professional Registration Process

Registration and licensing are powers reserved to the states: there is no national registration of engineers or architects. In addition, the registration process for engineers and architects is different.

The Engineering Process. The requirements for registration are almost the same for all states as most states have adopted the uniform exam prepared by the National Council of Engineering Examiners (NCEE). Although some states may differ, most states have the following general requirements (5:13-15).

1. Graduation from an Accreditation Board of Engineering and Technology (ABET) accredited school with an engineering degree.

2. Certification as an Engineering-In-Training. E.I.T. certification is achieved by passing an eight-hour examination on Fundamentals of Engineering.

3. Four years of approved engineering experience. The NCEE defines qualifying experience as the legal minimum number of years of creative engineering work requiring the application of engineering sciences to the investigation, planning, design, and construction of engineering works.

4. Completing a rather extensive application, including character references from several registered professional engineers.

5. Passing an eight-hour Principles and Practices of Engineering (P.E.) examination.

After passing the PE examination, the applicant is approved by the state board and agrees to a code of conduct enforceable by law. The individual then becomes a Professional Engineer.

The Architect Process. As is the case for engineers, the requirements for registration are almost the same for all states as most states have adopted the Architectural Registration Exam (A.R.E.) prepared by the National Council of Architecturaul Registration Boards. Although some states may differ, most have the following general requirements (14:116-118).

1. Graduation from the National Architectural Accrediting Board accredited school with an architecture degree.

2. Three years of internship after graduation under the direct supervision of a licensed architect or completed the requirements of the Intern Development Program.

3. Be of good character as verified by several registered architects.

4. Passing all nine sections of the four day Architectural Registration Examination (13:8).

After having passed the A.R.E., the applicant is approved by the state board and agrees to a code of conduct enforceable by law. The individual then becomes a Registered Architect.

Summary

In chapter 2, the relevant literature was reviewed. In addition, a brief description of the registration process was presented for both engineers and architects. The next chapter outlines the methodology used in this research effort.

III. Methodology

Overview

In chapter I, the basic problem was defined along with formulated investigative questions. This chapter outlines the procedures used to answer these questions, defines the population of interest, develops a survey questionnaire to gather the necessary data, and describes statistical tests and descriptive analysis to be performed based on the level of data gathered. Finally, the assumptions and limitations of this research effort are presented.

Justification Of Survey Approach

After considering several data collecting techniques (telephone interview, personal interview, questionnaire), a mailed questionnaire was determined to best satisfy the needs of this research effort.

> The advantages of a mailed questionnaire include relatively low cost, ease of preparation, and the ability to reach survey participants in a wide geographical area. In addition, the mailed survey allows the respondents extra time to weigh the alternatives and make responses that most accurately reflect their personal views. (10:307)

Although the mailed questionnaire was the only practical instrument to use in this study, the disadvantages are significant and need to be addressed. Emory identified two disadvantages of the mailed questionnaire. "First, it is usually subject to a strong bias of non-response thereby giving the researchers little control over the response rate" (10:308). The second major disadvantage of the mailed

questionnaire is it is usually limited as to the amount and type of information which can be gathered. The reason for this limitation is that respondents tend to cooperate less as the length of the questionnaire increases. According to Emory, "a general rule of thumb is that the subject should be able to complete the survey in ten minutes or less" (10:308).

In addressing the problem of non-response bias as it applies to this research effort, the concept of anonymity needs to be addressed. A basic premise of this study is the guarantee of survey participants' anonymity. The purpose of anonymity is to relieve the survey participants' concern that candid and honest answers would affect their professional careers. Because of the anonymity, there will not be any attempt to determine the identities of survey non-respondents. This makes it impossible for follow-up mailing to non-respondents to increase the response rate.

Questionnaire Structure

The questionnaire has four sections: background information, professional registration, attitudes and perceptions, and a section for additional comments. See Appendix A for a copy of the survey. Although this research is primarily interested in determining whether Air Force civil engineering officers perceive a need for professional registration, it will also attempt to determine the correlation between background information (grade, engineering specialty, and source of commissioning) and attitudes and perceptions.

The background information section includes the following variables: grade, engineering specialty, source of commissioning, and the number who have either started the registration process or are already registered. These questions will answer investigative questions 2 and 3.

The questions in the professional registration section are all multiple choice. This section includes questions concerning what study method is preferred in preparing for the registration exams. Also, it includes questions to determine the reasons respondents want to become professionally registered. In addition, there is a question to determine the reason for those who have no intention on registering. These questions will answer investigative questions 4, 5, and 6.

The attitude and perception section include statements which the respondents are asked to indicate how he views each statement based on a five-point Likert scale. The scale consists of five possible responses: (1) Strongly Disagree, (2) Disagree, (3) Undecided, (4) Agree, (5) Strongly Agree. The respondent is asked to indicate his level of agreement with each statement. The objective is to determine how Air Force civil engineers perceive the need or usefulness of professional registration. The statements in this section will be correlated with the answers given in the background information section. This section is used to answer investigative questions 1, 6, 7, and 8.

The comment section includes an open-ended question asking the respondent if they have any further remarks about the

questionnaire or professional registration in general.

The questionnaire was validated by pre-testing it with Air Force Civil Engineering officers enrolled in the Base Civil Engineering course at the School of Civil Engineering and Services, Wright-Patterson AFB.

The Measurement Scale

Several types of measurement scales were used in order to make sense of the information gathered from the research questions. The scales ranged from nominal level to ratio level.

According to Dominowski, "a nominal scale consists of a set of mutually exclusive categories" (8:46). This means that once you categorize an item, it can't be placed in any other category at the same time. The most important point about nominal level scales is that it makes no sense to add, subtract, multiply, or divide the numbers assigned to each category. A good example of a nominal scale is the set of numbers on the uniforms of baseball players.

If the categories of a scale are ordered, they constitute an ordinal scale. The important point is that even though the numbers may be consecutive, the numbers themselves does not mean that the items are equally spaced in terms of the characteristic being assessed. The most meaningful statistic for an ordinal scale is the mode. A good example of an ordinal scale is the rank of an officer.

"An interval scale is one in which the magnitudes of the numbers on a scale represent the order among the items in terms of the characteristic being measured and the distances between items" (8:47). Interval scales allow the use of computing means and standard deviations on the data. A good example of an interval scale is the temperature scale. The difference between 70 degrees and 65 degrees is larger than the difference between 70 degrees and 68 degrees but is exactly the same as the difference between 40 degrees and 35 degrees.

"A ratio scale has all of the characteristics of an interval scale plus a true zero point" (8:49). The value of zero indicates the complete absence of the characteristic being measured. The importance of the true zero value is that ratios of values on the scale can be meaningfully constructed. Again, means and standard deviations can be computed on ratio level data.

The questions in the background information and professional registration sections range from nominal level to ratio level. The attitude and perception section include interval level statements. The reader is encouraged to read the article by Baker, Hardyck, and Petrinovich for justification to consider a Likert scale interval level (2:291-309).

Population of Interest

The population of interest consists of all Air Force Civil Engineering officers on active duty. Civil service

engineers are not included because they are in a different situation, because as mentioned earlier, the U.S. Air Force Civilian Management Center is now requiring registration for key jobs. Thus they have different reasons for becoming registered.

Sample Size

In order to determine sample size, the population of Air Force Civil Engineering officers was broken up into strata by grade. Then the Neyman allocation procedure was used to determine the sample size for each strata (15:70-76). Finally, a simple random sample was taken from each strata. This method was used for several reasons. "First, the data should be more homogeneous within each stratum than in the population as a whole" (15:60). Second and First Lieutenants with less than four years of service probably have different attitudes towards professional registration than Majors or Lieutenant Colonels. "Second, when stratified random sampling is used, separate estimates of population parameters can be obtained for each stratum without additional sampling" (15:60). In other words, means and standard deviations can be computed for each stratum rather than just for the population. Since the data should be more homogeneous within each strata, the variability within each stratum is reduced, which produces stratified sampling estimators that have smaller variances than do corresponding simple random sampling estimators from same sample size.

Table 3-1 summarizes the results of the Neyman allocation procedure used to determine the minimum sample size required for each stratum.

TABLE 3-1

MINIMUM SAMPLE SIZE REQUIRED FOR EACH STRATUM

GRADE	N	VARIANCE	W	n	s
LT'S	826	1.0	0.39	53	248
CAPT	832	1.0	0.39	53	249
MAJ	271	1.0	0.13	17	81
LT COL	194	1.0	0.09	12	58
	2123			135	636

N = Total number of officers in that particular grade.
Data obtained 16 Jan 1987 from AFMPC/DRMRST.
VARIANCE = Best estimate since no prior data existed.
W = Proportion of sample size allocated to each strata.
n = Minimum sample size required for each stratum.
s = Sample size as obtained from Air Force Atlas search.
Note: The bound on the error of estimation was 0.25 with a probability of 0.997 or 3 standard deviations.

The actual stratified random sample was done by searching the Air Force Atlas for the last digit of the social security number of officers in the 55XX career field. Each digit represents approximately ten percent of the total number in the strata. Three digits for each strata were selected at random using a random number generator to give an adequate sample size to ensure a good return rate. For example, 3 X 10% X 826 = 248. The 248 is the approximate sample size that was obtained from the Air Force Atlas for the Lieutenants strata. The sample size for each stratum is shown in Table I. Then a questionnaire, a cover letter, and a computer-scan answer sheet was sent to each individual. Care was taken to

ensure each questionnaire mailed reflected the same quality as the original.

Method of Analysis

Hypothesis Testing. Hypothesis testing procedures are commonly used in research. The procedures involve a choice between two mutually exclusive answers. These answers are called hypotheses which are stated in statistical terms and set up such that one or the other hypothesis must be correct.

One of the two answers is called the null hypothesis and is denoted by Ho. The other answer is called the alternative hypothesis and is denoted by Ha. "These hypotheses must be specific and complete enough to allow the calculation of all possible observations that might be made" (8:204). The null hypothesis commonly refers to no change, no difference, or no departure from status quo. The alternative hypothesis is commonly referred to as the research hypothesis which contradicts the null hypothesis. The null and alternative hypotheses are decided before data collection begins. Then they are tested and the null hypothesis is rejected only if the data obtained is significantly different from status quo. In other words, Ho is true unless the data strongly contradicts it.

One of the risks in using hypothesis testing is decision error. This means that although the decision of rejecting the null hypothesis is based on the data collected, there is always some probability of error in making the decision.

There are two types of error in hypothesis testing; Type I and Type II errors. A Type I error consists of rejecting the null hypothesis when it is true. In other words, a Type I error would result if an innocent person was convicted. A Type II error consists of not rejecting the null hypothesis when it is false. In other words, a Type II error would result if a guilty person was set free. The test procedures must be set up such that both Type I and Type II errors are kept to a minimum.

The probability of making a Type I error is called the level of significance of the test and is denoted by alpha. A 0.05 level of significance was selected prior to the data collection. This level of significance is specified in AFM 25-5 for use in Air Force management engineering policies and procedures. At a 0.05 level of significance there is a five-percent probability to conclude Air Force engineers will perceive a need to become registered when in fact they don't.

Some of the following hypotheses were run using the Statistical Package for the Social Sciences, version 10 (SPSS-X). One of the reasons for using the SPSS is the contingency table analysis program. This program allows the data to be put in matrix form for analysis. The SPSS program allows up to an eight-way contingency table. In addition, another useful feature is the ability to recode variables to make new combinations out of the original data. For example, you can combine Second and First Lieutenants into one group while holding Captains, Majors, and Lieutenant Colonels

as separate groups. The hypotheses requiring a t-test were calculated long-hand as the SPSS procedures do not produce the desired results.

Hypothesis 1. AIR FORCE CIVIL ENGINEERING OFFICERS DO NOT PERCEIVE A NEED TO BECOME PROFESSIONALLY REGISTERED.

This hypothesis was tested using the responses to questions 12 and 19 from the survey instrument. Question 12 and 19 are similar in that both ask the respondent if registration is important for Air Force Civil Engineering officers. However, question 19 asks the question in a negative way so the responses can be validated in the analysis.

For purposes of this research, the data are considered interval level (2). According to Baker, et al., the statistical test used for this analysis is the test of means using the t-test (2).

The t-test is based on the difference between the sample mean and the value specified in the null hypothesis. The value of t is calculated by the formula $t = (x - u)/s$, where x is the sample mean, u is the value of the population mean given by the null hypothesis, and s is the estimate of the standard error of the mean. The degrees of freedom must also be determined before calculating t. The degrees of freedom are determined by the formula $df = n - 1$, where df is the number of degrees of freedom and n is the sample size. There are many t distributions based on the number of degrees

of freedom. For any t distribution, the mean is zero and ranges from positive to negative infinity. The t distribution approximates a normal distribution as the number of degrees of freedom increases.

The assumptions for using the t-test are: (1) the population of interest is a random sample of size n from a normal distribution, (2) the distribution has a mean of mu and a standard deviation of sigma both of which are unknown, and (3) there are n-1 degrees of freedom. The parameter of interest is mu, the true average number of individuals who do not perceive a need to become professionally registered. The statistical hypotheses are as follows:

Ho: $u \geq 3.5$

Ha: $u < 3.5$ alpha = 0.05

where mu falls within the range 1 to 5 using a five-point Likert scale.

The value "3.5" was selected prior to data collection and it was chosen based on the information in the literature review (chapter 2). The value "3.5" falls between "undecided" and "disagree" on the Likert scale used in the questionnaire. It was chosen on more of a "gut" feeling rather than any statistical procedure.

The null hypothesis states the Air Force Civil Engineering officers disagree somewhat with the survey question and do not perceive a need to become registered. The alternative hypothesis states they agree or are undecided

about the need to become registered.

For each question (12 and 19), a t-value was computed and compared to the critical t-value. The critical t-value was determined from a table of t values with alpha equal to 0.05 and degrees of freedom equal to n - 1. To reject the null hypothesis (Ho), the computed t-statistic must be less than the critical t-value.

Hypothesis 2. THE ATTITUDE TOWARDS PROFESSIONAL REGISTRATION DOES NOT VARY WITH OFFICER GRADE.

In this analysis, the rank of the respondent (question 2) was compared with his perception of professional registration (question 12). This hypothesis was tested using the chi-squared test and two-way contingency table analysis.

"The chi-squared test is particularly useful for analyzing nominal level data but can be used for higher level data" (10:415). The chi-square distribution ranges from zero to positive infinity and each distribution is based on the number of degrees of freedom (df). With low df, the distribution is positively skewed and as df increases, the distribution becomes more symmetrical. The data for this analysis is at least ordinal level. Since ordinal level data are one-step higher than nominal level data, the chi-squared test was used to analyze this hypothesis.

"The technique, contingency table analysis, is of the goodness-of-fit type which tests for significant differences between the observed distribution of data among categories and

the expected distribution based on the null hypothesis" (10:416). In contingency table analysis, each observation made by a respondent is classified as belonging to a finite number of categories. In other words, there are four possible categories of grade (Lt, Capt, Maj, Lt Col), and there are five categories of responses (strongly agree, agree, undecided, disagree, strongly disagree). For example, a Captain might respond with 'agree' to question 12. Each observation is then assigned to a specific cell within the contingency table. With Pij denoting the probability that a particular observation (j) made by a respondent (i) belongs to a particular cell, we want to investigate whether or not the proportions in the different categories (strongly agree - strongly disagree) are the same for all grades.

The assumptions for using the chi-squared test and contingency tale analysis are: (1) the population of interest is a random sample from a normal population, and (2) the contingency table has approximately a chi-squared distribution with (I-1)(J-1) degrees of freedom. The parameter of interest is Pij, the proportion of individuals in population i who fall into category j. The statistical hypotheses are:

$$H_o: \quad P_{1j} = P_{2j} = \ldots = P_{ij} \quad \text{for } j = 1,2,\ldots,J$$

$$H_a: \quad H_o \text{ is not true} \qquad \alpha = 0.05$$

The null hypothesis states the population of officers is homogeneous. That is, they all feel the same way towards professional registration. The alternative hypothesis states

the null hypothesis is not true and there is a significant difference in the attitudes towards professional registration based on officer grade. In order to reject the null hypothesis, the computed chi-squared statistic must be greater than the critical value of the chi-squared statistic. The critical value is determined from a table of chi-square distributions with alpha equal to 0.05 and df equal to (I-1) (J-1).

Hypothesis 3. THE REASONS FOR WANTING TO BECOME REGISTERED ARE INDEPENDENT OF EACH OTHER.

This hypothesis was tested using responses to questions 9 and 10. The data are nominal level, therefore the statistical test used to analyze the data was the chi-squared goodness-of-fit test (7:521). The assumptions for using this test are: (1) population of interest is a random sample from a normal population, (2) the data has approximately a chi-squared distribution with I-1 degrees of freedom. The parameter of interest is p, the proportion of responses for each alternative in questions 9 and 10. The statistical hypotheses for each question are:

Question number 9: If you are not already registered, what would be your primary reason for becoming Professionally registered? (see Table 3-2 for alternatives)

Ho: $p3 = p4 = p5 = p6 = p7 = 0.20$

Ha: at least one of the p's does not equal 0.20
alpha = 0.05

TABLE 3-2

VARIABLES FOR QUESTION 9

Variable	Description
p3	Credibility with A-E firms
p4	Credibility with peers
p5	Career progression
p6	Personal goal
p7	Other reasons

Note: all responses are not included because those alternatives are not a reason for wanting to become registered, rather, they are dummy answers.

Question number 10: If you are already registered, what was your primary reason for becoming Professionally registered? (see Table 3-3 for alternatives)

Ho: $p2 = p3 = p4 = p5 = p6 = 0.20$

Ha: at least one of the p's does not equal 0.20

where the subscript is a particular alternative to the question.

TABLE 3-3

VARIABLES FOR QUESTION 10

Variable	Description
p2	Credibility with A-E firms
p3	Credibility with peers
p4	Career progression
p5	Personal goal
p6	Other reasons

Note: all responses are not included because those alternatives are not a reason for wanting to become registered, rather, they are dummy answers.

The null hypothesis states there is an equal chance for each alternative to each question. In other words, no one reason is significantly different from the others. The alternate hypothesis states that at least one of the reasons

is significantly different from the others. In order to reject the null hypothesis, the computed chi-squared statistic must be greater than the critical chi-squared value.

Hypothesis 4. THERE AREN'T ANY DIFFERENCES IN THE REASONS FOR NOT WANTING TO BECOME REGISTERED.

This hypothesis was tested using responses to question 11. The data are nominal level, therefore the statistical test used to analyze the data was the chi-squared goodness-of-fit test. The assumptions for using this test are: (1) population of interest is a random sample from a normal population, (2) the data has approximately a chi-squared distribution with I-1 degrees of freedom. The parameter of interest is p, the proportion of responses for each alternative for question 11. The statistical hypothesis are:

Ho: $p1 = p2 = p3 = p4 = p5 = p6 = 0.167$

Ha: at least one of the p's does not equal 0.167
alpha = 0.05

where the subscript is a particular alternative to the question. (see Table 3-4 for alternatives)

TABLE 3-4

REASONS FOR NOT WANTING TO REGISTER (QUESTION 11)

Variable	Description
p1	Air Force doesn't require it
p2	Takes too much time
p3	Out of school too long
p4	Don't want to
p5	State Registration Board won't accept experience
p6	Other reasons

The null hypothesis states there is an equal likely chance for each alternative to question 11. In other words, no one alternative is significantly different from the others. The alternate hypothesis states that at least one of the reasons is significantly different from the others. In order to reject the null hypothesis, the computed chi-square statistic must be greater than the critical chi-square value.

Hypothesis 5. THERE ISN'T A PREFERENCE IN STUDY METHOD IN PREPARING FOR THE REGISTRATION EXAMS.

This hypothesis was tested using responses to questions 6, 7, and 8. The data are nominal level, therefore the statistical test used to analyze the data was the chi-squared goodness-of-fit test (7:521). The assumptions for using this test are: (1) population of interest is a random sample from a normal population, (2) the data has approximately a chi-squared distribution with I-1 degrees of freedom. The parameter of interest is p, the proportion of responses for each alternative for a given questions 6, 7, and 8.

The statistical hypothesis for each question is:

Question number 6: What study method do you plan to use in preparing for the E.I.T. or the A.R.E exam? (see Table 3-5 for alternatives)

Ho: $p3 = p4 = p5 = p6 = p7 = p8 = 0.167$

Ha: at least one of the p's does not equal 0.167
alpha = 0.05

Question number 7: What study method do you plan to use in preparing for the P.E. exam? (see Table 3-5 for alternatives)

Ho: $p3 = p4 = p5 = p6 = p7 = p8 = 0.167$

Ha: at least one of the p's does not equal 0.167
alpha = 0.05

Question number 8: If the Air Force provided various study programs, which method would you find most beneficial? (see Table 3-6 for alternatives)

Ho: $p3 = p4 = p5 = p6 = p7 = p8 = p9 = 0.143$

Ha: at least one of the p's does not equal 0.143
alpha = 0.05

where the subscript is a particular answer to the question.

TABLE 3-5

PREFERRED STUDY METHOD FOR E.I.T./A.R.E./P.E. (QUESTION 6,7)

Variable	Study Method
p3	Self study
p4	Study group
p5	College refresher course with tuition assistance
p6	Video tapes
p7	Study guides or manuals
p8	Other reasons

TABLE 3-6

PREFERENCE FOR AIR FORCE PROVIDED STUDY METHOD

Variable	Study Method
p3	Self study
p4	Short course at AFIT
p5	College refresher course with tuition assistance
p6	Prefer to study by myself
p7	Study guides or manuals
p8	Architectural licensing seminar
p9	Other reasons

Note: all responses are not included because some answers are not a reason for wanting to become registered, rather, they are dummy answers.

The null hypothesis states there is not a preference in study method. Each study method has an equal preference method of being used in preparing for the registration exams. The alternate hypothesis states that at least one of the study methods is preferred over the others. In order to reject the null hypothesis, the computed chi-squared statistic must be greater than the critical chi-squared value.

Hypothesis 6 AIR FORCE CIVIL ENGINEERS WHO ARE REGISTERED PERCEIVE REGISTRATION HELPS THEM IN THEIR JOB.

This hypothesis was tested using questions 4 and 13. The data is at least interval level, therefore the statistical test used to analyze the data is the test of means using the t-test (see hypothesis number 1 for the assumptions in using the t-test). To do the analysis, the mean was computed for question 13 for all the respondents who marked three (were already a Professional Engineer or a Registered Architect) to question four. The parameter of interest is mu, the true average number of respondents who perceive registration has helped them in their current job.

Ho: $u \leq 2.0$

Ha: $u > 2.0$ alpha = 0.05

where mu falls within the range 1 to 5 using a five-point Likert scale.

The value "2.0" was selected prior to data collection and it was chosen based on the information in the literature review (chapter 2). The value "2.0" represents "agree" on the Likert scale used in the questionnaire. It was chosen on more of a "gut" feeling rather than any statistical procedure.

The null hypothesis states that the respondent agrees with the statement and perceives registration does help them in their job. The alternate hypothesis states that the respondent does not perceive registration will help them in their job. In order to reject the null hypothesis, the computed t-statistic must be greater than the critical t-value.

Hypothesis 7. AIR FORCE CIVIL ENGINEEERS WHO ARE NOT REGISTERED PERCEIVE *REGISTRATION WOULD HELP THEM IN* THEIR JOB.

This hypothesis was tested using questions 4 and 13. The data is at least interval level, therefore the statistical test used to analyze the data is the test of means using the t-test (see hypothesis number 1 for the assumptions in using the t-test). To do the analysis, the mean was computed for question 13 for all the respondents who marked one, two, four, or five (were not registered) to question four. The parameter of interest is mu, the true average number of respondents who perceive registration has helped them in their current job.

Ho: $u \leq 2.0$

Ha: $u > 2.0$ alpha = 0.05

where mu falls within the range 1 to 5 using a five-point Likert scale.

The value "2.0" was selected prior to data collection and it was chosen based on the information in the literature review (chapter 2). The value "2.0" represents "agree" on the Likert scale used in the questionnaire. It was chosen on more of a "gut" feeling rather than any statistical procedure.

The null hypothesis states that the respondent agrees with the statement and perceives registration would help them in their job. The alternate hypothesis states the respondent does not perceive registration would help them in their job. In order to reject the null hypothesis, the computed t-statistic must be greater than the critical t-value.

Assumptions And Limitations

The assumptions of this research are:

1. Survey respondents took the time to adequately consider each response, and then answered honestly.
2. Non-response of some of the target population did not effect the conclusions of the research effort.
3. The survey questionnaire is a valid and reliable attitude measurement tool. It is valid because it measures what it is supposed to measure and is reliable because it provides consistent results.
4. The method of using the last digit of the social security number for the Atlas search provided a random sample.

5. Top level military civil engineers will continue their push to have all engineers registered.

The limitations of this research is the measurement of perception is qualitative in nature and only limited accuracy can be achieved in the measurement of attitudes.

Summary

This chapter explained the research methodology used in this study. The justification for using the survey approach, questionnaire structure, measurement scale, population of interest, sample size, method of analysis (which includes the hypotheses to be tested), and assumptions and limitations were presented. The next chapter will analyze the data gathered from the survey respondents.

IV. Data Analysis

Overview

This chapter presents the results from the data collection and the analysis of the hypotheses stated in chapter 1. The data was collected using the questionnaire explained in chapter 3 (see Appendix A). Some of the analysis was performed using selected subroutines from the Statistical Package for the Social Sciences (SPSS). The t-tests were hand calculated as the SPSS procedures were not compatible with this research.

Survey Response

A total of 620 surveys were distributed to Air Force civil engineering officers in the grade Second Lieutenant to Lieutenant Colonel. This represents approximately one-fourth of all Air Force civil engineering officers. Of the 620 surveys sent out, 442 were returned, which was approximately a 71% return rate.

The high return rate is probably due to the nature of the topic. Professional registration is a controversial topic in the Air Force civil engineering community. The reasons for this are presented later in this research paper.

Research Hypothesis Results

Hypothesis 1. AIR FORCE CIVIL ENGINEERING OFFICERS DO NOT PERCEIVE A NEED TO BECOME PROFESSIONALLY REGISTERED.

Ho: $u \geq 3.5$

Ha: $u < 3.5$ alpha = 0.05

Analysis. This hypothesis was tested using the responses from questions 12 and 19. These questions asked for the respondents perceptions of professional registration. The responses to questions 12 and 19 were analyzed using a t-test. The results are as follows:

QUESTION	D.F.	MEAN	STANDARD DEVIATION	T-CRITICAL	T-VALUE	RESULT
12	441	2.97	1.268	-1.64	-8.70	REJ Ho
19	441	3.02	1.181	-1.64	-8.53	REJ Ho

Note: T-critical obtained from Devore (7:622).

This indicates Air Force civil engineering officers either agree or are undecided about the need for professional registration. A value of three on the Likert scale indicates the respondent is "undecided" about the need for registration. In this case, the means were 2.97 and 3.01 for questions 12 and 19, respectively.

Using the FREQUENCIES subroutine in the SPSS, the count of the responses to questions 12 and 19 were computed and are shown in Table 4-1.

TABLE 4-1

PERCEPTION OF NEED FOR PROFESSIONAL REGISTRATION

VALUE	LABEL	QUESTION 12 COUNT (%)	QUESTION 19 COUNT (%)
1	Strongly Agree	60 (14)	38 (9)
2	Agree	132 (30)	141 (33)
3	Undecided	56 (13)	82 (19)
4	Disagree	148 (33)	126 (29)
5	Strongly Disagree	45 (10)	44 (10)

For both questions, the responses were centered around "undecided". However, the majority of the responses were either "Agree" or "Disagree". Fourty-four percent marked "Strongly Agree" or "Agree" to question 12 and fourty-three percent marked "Strongly Disagree" or "Disagree". For question 19, the results were 42% and 39% respectively. This is why the mean for both questions was approximately 3.0. The results indicate engineers are either for or against registration. Only 13% of the respondents marked "undecided" for question 12 and 19% marked "undecided" for question 19.

Hypothesis 2. THE ATTITUDE TOWARDS PROFESSIONAL REGISTRATION DOES NOT VARY WITH OFFICER GRADE.

Ho: $P1j = P2j = \ldots = Pij$ for $j = 1,2,\ldots,J$

Ha: Ho is not true alpha = 0.05

Analysis. This hypothesis was tested using the responses from questions 2 and 12. Question 2 asks for the respondents rank and question 12 asks for their perception of professional registration. The results were computed using

the CROSSTABS subroutine in the SPSS. The results are as follows:

CHI-SQUARE	D.F.	CRITICAL VALUE	RESULT
18.78	12	21.03	DO NOT REJECT Ho

Note: Critical value obtained from Devore(7:623)

The attitude towards professional registration doesn't vary with officer grade at a 0.05 level of significance. Table 4-2 shows the actual count of the responses as well as the expected count for each cell.

TABLE 4-2

OFFICER GRADE VERSUS PERCEIVED NEED FOR REGISTRATION

	STRONGLY AGREE	AGREE	UNDECIDED	DISAGREE	STRONGLY AGREE
LT	24 17.3	40 38.0	15 16.1	31 42.6	17 13.0
CAPT	20 28.4	56 62.6	27 26.5	84 70.1	22 21.3
MAJ	9 8.0	23 17.7	6 7.5	17 19.8	4 6.0
LT COL	7 6.3	13 13.8	8 5.8	16 15.4	2 4.7
TOTAL	60	132	56	148	45

The top number in each cell is the actual count for the cell. The bottom number is the expected count for the cell. To calculate the chi-square statistic for a particular cell, the expected count is subtracted from the actual count and then squared. This result is then divided by the expected

count. The closer the actual count is to the expected count, the lower the chi-square statistic. The overall chi-square statistic is the summation of the chi-square statistics for each cell. For example, the chi-square statistic for LT's who are "undecided" is (15-16.1)↑2/16.1 = 0.075.

From Table 4-2, the reader can see the majority of responses were either "Agree" or "Disagree". There is about a 50/50 split in the attitude towards the perception of registration. This indicates the respondents are either for or against registration and not many are neutral.

Hypothesis 3. THE REASONS FOR WANTING TO BECOME REGISTERED ARE INDEPENDENT OF EACH OTHER.

Question 9: If you are not already registered, what would be your primary reason for becoming Professionally registered?

Ho: p3 = p4 = p5 = p6 = p7 = 0.20

Ha: at least one of the p's does not equal 0.20
alpha = 0.05

Question 10: If you are already registered, what was your primary reason for becoming Professionally registered?

Ho: p2 = p3 = p4 = p5 = p6 = 0.20

Ha: at least one of the p's does not equal 0.20
alpha = 0.05

Analysis. This hypothesis was tested using the responses from questions 9 and 10. Question 9 asks those not already registered their primary reason for wanting to become registered. Question 10 asks those already registered

their primary reason for becoming registered. Both questions were analyzed using the chi-square procedure of the NPAR TEST subroutine in the SPSS. The results are as follows:

QUESTION	CHI-SQUARE	D.F.	CRITICAL VALUE	RESULT
9	173.5	4	9.5	REJECT Ho
10	49.3	4	9.5	REJECT Ho

Note: Critical values obtained from Devore(7:623).

For both questions, at a 0.05 level of significance, the null hypothesis was rejected. This means at least one of the reasons for wanting to become registered was significantly different from the others. The primary reason for wanting to become registered can be determined by examining the frequency of the responses to each question. Table 4-3 shows the count for each question.

TABLE 4-3

PRIMARY REASON FOR BECOMING REGISTERED

CATEGORY	QUESTION 9 (%)	QUESTION 10 (%)
Credibility with A-E Firms	42 (13)	15 (21)
Credibility with Peers	28 (9)	8 (11)
Career Progression	93 (29)	9 (13)
Personal Goal	142 (44)	37 (51)
Other	15 (5)	3 (4)

In both cases, "personal goal" was the primary reason for wanting to become registered. And for those not already registered, 29% felt getting registered would help them in their career progression. Those who marked "other" stated the reason they wanted to become registered was they were

contemplating separation from the Air Force. They felt registration would make them more marketable in the civilian engineering community.

Hypothesis 4. THERE AREN'T ANY DIFFERENCES IN THE REASONS FOR NOT WANTING TO BECOME REGISTERED.

Ho: $p1 = p2 = p3 = p4 = p5 = p6 = 0.167$

Ha: at least one of the p's does not equal 0.167
alpha = 0.05

Analysis. This hypothesis was tested using the responses from question 11. Question 11 asked the respondent his primary reason for not wanting to become registered. The analysis was computed using the chi-square procedure of the NPAR TEST subroutine in SPSS. The results are as follows:

CHI-SQUARE	D.F.	CRITICAL VALUE	RESULT
939.3	5	11 1	REJECT Ho

Note: Critical value obtained from Devore(7:623).

At a 0.05 level of significance, the null hypothesis was rejected. This indicates at least one of the reasons is significantly different from the others. The large chi-square value can be explained by examining the count of the responses for question 11 as shown in Table 4-4.

TABLE 4-4

PRIMARY REASON FOR NOT WANTING TO REGISTER

CATEGORY	COUNT (%)
AF Doesn't Require It	311 (81)
Takes Too Much Time	10 (2)
Been Out of School Too Long	36 (9)
Don't Want To	14 (4)
Don't Think Board Will Accept My AF Experience	14 (4)

For this question, the response significantly different from the others is "AF Doesn't Require It". This is why the chi-square value is so large. This indicates many officers perceive registration is "nice to have" but it is not stressed in the Air Force. One of the reasons for this is an Air Force officer doesn't need a license to be an engineer. The Federal government accepts the responsibility for mistakes made by the engineers.

With this perception, it will be difficult to convince officers to get registered. As pointed out in hypothesis 3, the primary reason for getting registered was "personal goal". Unless significant changes are made in the promotion system, such as requiring registration for promotion to Lieutenant Colonel or higher, there just won't be any incentive for registration. Another option is instituting professional pay for all registered engineers.

Question 17 asked the respondent if an engineering bonus (similar to doctors and lawyers) for being registered would motivate them to become registered. Table 4-5 shows the responses.

TABLE 4-5

ENGINEERING BONUS WOULD MOTIVATE ME TO BECOME REGISTERED

VALUE	COUNT (%)
Strongly Agree	208 (47)
Agree	164 (37)
Undecided	25 (6)
Disagree	35 (8)
Strongly Disagree	10 (2)

From Table 4-5, 84% said an engineering bonus would motivate them to get registered.

Hypothesis 5. THERE ISN'T A PREFERENCE IN STUDY METHOD IN PREPARING FOR THE REGISTRATION EXAM.

Questions 6 and 7: What study method do you plan to use in preparing for the E.I.T., A.R.E., or the P.E. exam?

Ho: $p3 = p4 = p5 = p6 = p7 = p8 = 0.167$

Ha: at least one of the p's is different
alpha = 0.05

Question 8: If the Air Force provided various study programs, which method would you find most beneficial?

Ho: $p3 = p4 = p5 = p6 = p7 = p8 = p9 = 0.143$

Ha: at least one of the p's is different
alpha = 0.05

Analysis. This hypothesis was tested using the responses to questions 6, 7, and 8. Question 6 and 7 asked the respondent what study method he planned on using to prepare for the E.I.T., A.R.E., or P.E. exam. Question 8 asked if the Air Force provided a study method, what method

would they prefer? The analysis was computed using the chi-square procedure of the NPAR TEST subroutine in the SPSS. The results are shown in Table 4-6.

TABLE 4-6

ANALYSIS OF PREFERRED STUDY METHOD

QUESTION	CHI-SQUARE	D.F.	CRITICAL VALUE	RESULT
6	117.4	5	11.1	REJECT Ho
7	197.8	5	11.1	REJECT Ho
8	254.5	6	12.6	REJECT Ho

Note: The critical value was obtained from Devore (7:623)

The null hypothesis was rejected for each question at a 0.05 level of significance. This indicates that at least one of the study methods was significantly different from the others and there is a preference in study method in preparing for the exams. Using the FREQUENCIES subroutine in the SPSS, the count for each question was computed and is shown in Tables 4-7 and 4-8.

TABLE 4-7

STUDY METHOD FOR E.I.T./A.R.E./P.E.

CATEGORY	QUESTION 6 (%)	QUESTION 7 (%)
Prefer to Study Alone	54 (33)	92 (35)
Study Group	6 (4)	8 (3)
Tuition Assistance	28 (17)	47 (18)
Video Tapes	12 (7)	10 (4)
Study Guides/Manuals	64 (39)	103 (40)

TABLE 4-8

STUDY METHOD IF AIR FORCE PROVIDED

CATEGORY	QUESTION 8 (%)
Prefer to Study Alone	18 (7)
AFIT Short Course	123 (45)
Tuition Assistance	46 (17)
Study Guides/Manuals	48 (17)
Architectural Licensing Seminar	39 (14)

In Table 4-7, the two categories, "Prefer to study alone" and "Study guides/manuals" are essentially the same. Study guides/manuals would be used by an engineer to study for the exam. For question 6, 72% said they would "prefer to study alone" or use study guides/manuals and 75% said the same for question 7. This is to be expected as engineers tend to work alone. Also, when taking the exam, one is allowed to use reference materials and textbooks. Therefore, using a study guide/manual to prepare for the exam, you become familiar with the contents of the guide. This makes it easier to locate the correct part of the guide to help answer exam questions.

In Table 4-8, the preferred Air Force provided study method was an AFIT short course (45%). This is probably because AFIT courses do not cost the individual anything.

But this is a little misleading because while only 39 respondents marked Architectural Licensing Seminar (ALS), it represents 70% of the architects. An ALS would only be used by an architect to prepare for the A.R.E.

Hypothesis 6. AIR FORCE CIVIL ENGINEERS WHO ARE REGISTERED PERCEIVE REGISTRATION HELPS THEM IN THEIR JOB.

Ho: $u \leq 2.0$

Ha: $u > 2.0$ alpha = 0.05

Analysis. This hypothesis was tested using the responses from questions 4 and 13. Question 4 asked the respondent whether or not he was registered. Question 13 asked the respondent his perception whether registration helps them in their job. A t-test was performed on the mean of the responses to question 13 for all of the respondents who marked they were already registered to question 4. The results are as follows:

D.F.	MEAN	STANDARD DEVIATION	T-CRITICAL	T-VALUE	RESULT
67	3.12	1.28	1.67	7.13	REJECT Ho

Note: T-critical obtained from Devore(7:622).

The null hypothesis was rejected at a 0.05 level of significance. This indicates Air Force Civil Engineering officers who are already registered perceive registration doesn't help them in their job or are undecided. This is an important result for those contemplating registration. If a registered engineer doesn't perceive registration helps them in their job, then those contemplating registration are less likely to become registered. As shown in hypothesis 3, the primary reason for becoming registered was "personal goal".

Unless some other incentive is given for becoming registered, the percentage of engineers getting registered probably won't increase.

Hypothesis 7. AIR FORCE CIVIL ENGINEERS WHO AREN'T REGISTERED PERCEIVE REGISTRATION WOULD HELP THEM IN THEIR JOB.

Ho: $u \leq 2.0$

Ha: $u > 2.0$ alpha = 0.05

Analysis. This hypothesis was tested using the responses from questions 4 and 13. Question 4 asked the respondent whether or not he was registered. Question 13 asked the respondent his perception of whether or not registration would help him in his job. A t-test was performed on the mean of the responses to question 13, for all of the respondents who marked they were not registered to question 4. The results are as follows:

DEGREES OF FREEDOM	MEAN	STANDARD DEVIATION	T-CRITICAL	T-VALUE
368	3.50	1.25	1.65	23.0

Note: T-critical obtained from Devore(6:622).

At a 0.05 level of significance, the null hypothesis was rejected. This indicates Air Force Civil Engineering officers who are not registered perceive registration would not help them in their job or are undecided. The result again is important for engineers contemplating registration. If they

aren't sure whether registration is going to help them, then why do it in the first place?

Question four asked for the respondents registration status and the results are shown in Table 4-9.

TABLE 4-9

REGISTRATION STATUS

CATEGORY	COUNT (%)
Passed the E.I.T.	149 (34)
Passed Sections of the A.R.E.	19 (4)
Already Registered	67 (15)
Have Not Taken the E.I.T. nor any Sections of the A.R.E.	162 (37)
Do Not Intend to Take Exams	45 (10)

Only 15% of the respondents are registered although 38% have taken some initiative to become registered for a total of 53%. This is encouraging if the results could be extrapolated to the Air Force civil engineering community. This contrasts with the 38% of Air Force engineering officers who were already registered or passed the E.I.T. as stated in chapter 2. The contrast is probably due to the way the 38% was calculated. The numbers used in the calculations were obtained from the Directory of Professional Registration published by the Air Force Engineering and Services Center. Only officers knowing about and wanting their names included in the directory were used in the calculation.

The four percent who marked "Passed sections of the A.R.E" is misleading because only architects would respond with that answer. Since there were 56 architects in the

survey, 34% of them had taken some initiative to become registered. The Air Force may be in better shape than originally thought.

Summary

This chapter presented the results of the data collection and an analysis of each hypothesis. The next chapter looks at the significance of these results and provides recommendations for further study.

V. Conclusions and Recommendations

Introduction

This chapter discusses the significance of the results and conclusions from the analysis of the previous chapter. The significance of the hypotheses are discussed separately. In addition, recommendations are presented for follow-on studies.

Significance of the Results

Hypothesis 1. AIR FORCE CIVIL ENGINEERING OFFICERS DO NOT PERCEIVE A NEED TO BECOME PROFESSIONALLY REGISTERED. The results indicate Air Force civil engineering officers do agree there is a need to become professionally registered or are undecided.

After reviewing the results to the open-ended question, the above findings were anticipated. Approximately 120 people took the time to write about their perception of professional registration in the Air Force. The majority of respondents said registration was important because it gave the Air Force engineering community greater credibility. The rest of the respondents said we were officers and leaders first, and engineers second. Therefore, registration was not important to them. Registration was nice to have but it wouldn't help them at their job or for promotion.

The officers affected the most are the architects. As stated in chapter 2, they must work directly for a registered engineer or architect. If they don't, many states won't

consider their work experience when applying to take the Architectural Registration Exam. Most of the jobs in Air Force Civil Engineering do not allow an architect to work for a registered engineer or architect. Thus, while an architect may be in a job where he can gain practical experience, registration boards won't consider it because he didn't work directly for a registered engineer or architect.

Therefore, the Air Force needs to establish a policy on registration. One policy would be to make registration mandatory for promotion to Lieutenant Colonel. This would give the officer plenty of time to gain practical experience for registration since the earliest time for promotion to Lieutenant Colonel is about 14 years. Another policy is for the Air Force to come right out and tell the engineers they are officers first, and engineers second. Although officership comes first, it doesn't mean registration is any less important. An engineer should be both an officer and an engineer at the same time.

Hypothesis 2. THE ATTITUDE TOWARDS PROFESSIONAL REGISTRATION DOES NOT VARY WITH OFFICER GRADE. The results indicate officer grade has little effect on the attitude towards registration. All ranks viewed registration the same.

Prior to this research, it was thought junior officers would have a different perception about registration than senior officers. Presumably, junior officers who just graduated from college would strongly agree for the need for

registration. Whereas, senior officers who had already been promoted, would not see as great a need. However, the results indicate there wasn't any difference.

There are several reasons why there weren't any difference in attitudes. Junior officers frequently work in an office where there aren't any other registered engineers. They perceive if no one else is registered, then why should I? Also, the Base Civil Engineer (BCE) plays a key role in this perception without realizing it. At many U.S. Air Force bases, the BCE is not registered though he is considered the expert for all engineering activities on the base. The junior engineer perceives that registration is probably not important since a person can become a BCE without registering.

Hypothesis 3. THE REASONS FOR WANTING TO BECOME REGISTERED ARE INDEPENDENT OF EACH OTHER. The result indicate at least one of the reasons for wanting to become registered was significantly different from the others.

The primary reason for wanting to become registered was to achieve "a personal goal". Many of the respondents stated this in the open-ended question. In addition, 29% felt registration would help their career in the Air Force. Some of the respondents marked "other" and stated they were contemplating getting out of the Air Force. They felt registration would make them more marketable in the civilian engineering community.

The importance of this hypothesis is if senior level managers in the Air Force want to have more engineering officers registered, they will have to change the attitude of the civil engineering officers. This could be done by offering some kind of incentive. Such incentives include, making registration mandatory for promotion as stated in hypothesis one or offering a monetary bonus or professional pay for registration. Also, certain jobs in the career field, such as the Base Civil Engineer (BCE), should be filled with only registered professional engineers. This is what the U.S. Air Force Civilian Management Center is doing with over 360 key engineering and services positions.

However, filling the BCE position with only registered officers has a drawback. Many times the BCE position is filled with a rated officer. This is done for several reasons. First, it gives the officer a chance for career broadening. Second, it gives the rated officers a chance to fill a commanders position since there aren't enough in the rated side for all the eligible officers. So, before certain jobs are coded for only registered engineers, the issue of rated officers would have to be determined.

Hypothesis 4. THERE AREN'T ANY DIFFERENCES IN THE REASONS FOR NOT WANTING TO BECOME REGISTERED. The results indicate at least one of the reasons for not wanting to become registered was significantly different from the others. The response significantly different from the others was the "AF

Does Not Require It". As stated in hypothesis one, many engineering officers stated registration was nice to have but was not encouraged in the Air Force. One doesn't need a license to be an engineer in the Air Force because the Federal government accepts the responsibility for mistakes made by the engineers. Thus, there is little incentive to become registered other than for personal reasons as stated in hypothesis three.

However, this attitude could be changed by offering an incentive. Over eighty percent (84%) of the respondents said an engineering bonus would motivate them to get registered.

Hypothesis 5. THERE ISN'T A PREFERENCE IN STUDY METHOD IN PREPARING FOR THE REGISTRATION EXAMS. The results show at least one of the study methods was significantly preferred over the others. The study method preferred by those preparing for the E.I.T., A.R.E. or P.E. exam was "Prefer to Study Alone" and "Study Guides/Manuals". As pointed out in chapter four, the two study methods go together. A person preparing for the exams by himself would probably use study guides/manuals. Also, one is allowed to use reference materials and text books when taking the exam. By using a study guide/manual to prepare for the exam, one would be familiar with the contents of the study guide. Since time is critical in finishing the exam, familiarization will make it easier to find examples in the study guide/manual to help answer the exam questions.

The preferred study method for an Air Force funded program was a short course offered at the School of Civil Engineering and Services, Air Force Institute of Technology (AFIT). A number of respondents stated in the open-ended question an AFIT sponsored course would be the most beneficial, especially if the course was offered prior to taking the registration exam. Better yet, the course should be scheduled to allow the students to return to their home and take the exam the following week.

The responses to the open-ended question brought out several more important points. First, E.I.T., A.R.E. and P.E. refresher courses offered at local colleges are not eligible for tuition assistance through the Air Force. The Air Force needs to change the rules of eligibility for taking such courses. A number of respondents said they would have taken a college refresher course if the Air Force provided financial assistance. The second point was to provide financial assistance to offset the cost of the exam. It costs approximately $100.00 to take the E.I.T./P.E. and $300.00 to take the A.R.E. More engineers and architects might be inclined to take the exams if financial assistance was available.

Hypothesis 5. AIR FORCE CIVIL ENGINEERS WHO ARE ALREADY REGISTERED PERCEIVE REGISTRATION HELPS THEM IN THEIR JOB. The results show officers who were already registered did not perceive registration helped them in their job or were

undecided. This result is important for engineers contemplating registration. If a registered engineer doesn't perceive registration helps him, then it is very difficult to convince those contemplating registration. If there aren't any benefits, then why do it? This was partially answered by hypothesis three. Many respondents see registration as a personal goal. However, registration is probably the biggest step in an engineer or architects' profession. One can go no higher other than becoming registered in more than one state. This is why the Air Force needs to offer an incentive for registration. "A Personal goal" is not a strong enough incentive for everyone.

Hypothesis 7. AIR FORCE CIVIL ENGINEERING OFFICERS WHO ARE NOT REGISTERED PERCEIVE REGISTRATION WOULD HELP THEM IN THEIR JOB. The results indicate officers who were not registered didn't perceive registration would help them. The result again is important because an engineer may decided against it if he perceives registration would not help them in their job. Preparing for the exams takes a lot of time and that time may be better spent studying for a Masters degree or Professional Military Education.

Most officers on the promotion boards are unaware of the professional registration process and its professional significance. A remedy to this problem is to include a block for professional registration on the officer brief used by

promotion boards. Also, the board president should brief the board members on the importance of registration.

However, over half (53%) of the respondents had already taken some initiative to become registered or were registered. This contrasts with the 38% as reported in chapter 2. The 38% was calculated using data from the 1985 Air Force Directory of Registration since that was the last year it was published. Only individuals who knew about the directory and wanted their name in the directory, are included in the calculation. Therefore, Air Force leaders may be content knowing over half of the civil engineering officers have actively sought registration.

Conclusions

Air Force civil engineering officers do perceive a need for professional registration. However, they don't perceive it helps them with their job or promotion. In fact, "personal goal" was the primary reason for getting registered. Promotion is one of the biggest challenges facing everyone in the military. Civil engineering officers don't feel registration will help them get promoted, thus they probably won't take the time to persue it. They perceive their time is better spent studying for a Masters degree or completing Professional Military Education (PME).

Making registration mandatory for certain jobs would probably encourage officers to get registered. If officers know the only way they can become a Base Civil Engineer is by

being registered, they will probably be more inclined to do so. On the other hand, there is a disadvantage to this as well. Officers who have been out of school for a while (i.e. field grade officers), may think they can no longer pass the exam. Thus, instead of attempting the exam, they may retire after twenty years resulting in a further shortage of field grade officers. The Air Force could have a "grandfather clause" to ease this situation.

Another obstacle facing registration is the promotion board. The boards are not aware of the significance of professional registration. They need to be briefed on the significance of registration prior to making their selections. In addition, a special block for registration needs to be included on the officers' brief. If officers know registration is important as a Masters degree or PME, then they are more likely to obtain their license.

Recommendations For Follow-on Studies

The recommendations fall into two categories. The first concerns with modifying the survey and the second with a study at some future date to see whether the attitudes and perceptions change over time.

Modifying the Survey. There are two areas which require modifications in the survey. These areas are the demographics and the attitude and perception sections. Several of these ideas were a direct result of the open-ended question.

The first modification in the demographic section is to ask the sex of the officer. It is possible that females have a different perception than males.

Another modification is to add a response to question 4. The response, "have taken the E.I.T. or sections of the A.R.E. and I am waiting for the results", should be added. Some of the respondents suggested this in the open-ended question. Although this modification would not change the results of the tests, it would make the respondents more comfortable in answering the question. Thus, possibly increasing the return rate.

Probably the biggest change is in the attitude and perceptions section. The respondent should be given two columns to answer. One column is for marking their perception of professional registration in the Air Force and the second column is for the respondent to mark how he personally feels about professional registration. These two columns can then be compared with one another.

Another modification is to change the wording of the directions for the attitude and perception section. Some of the respondents did not interpret the question correctly. This was discovered because they stated it in the open-ended question. This could have a direct bearing on the results of the tests.

Future Studies. A follow-on study using the survey developed for this research should be performed in 3-5 years to see whether the attitudes and perceptions change. The

Director of Engineering and Services, Maj Gen Ellis, has actively supported and encouraged professional registration since he took over. Thus, it would be interesting to see if more engineers are get registered or the number stays the same.

Appendix A: Survey Instrument

SECTION I. BACKGROUND INFORMATION

For each of the following questions, circle the one item which best applies to you. (circle one.)

1. What is your engineering specialty ?

   1. CIVIL
   2. MECHANICAL
   3. ELECTRICAL
   4. ARCHITECTURAL
   5. INDUSTRIAL
   6. GENERAL
   7. OTHER (PLEASE SPECIFY) _____

2. What is your current grade ?

   1. O-1
   2. O-2
   3. O-3
   4. O-4
   5. O-5

3. What was your source of commissioning ?

   1. SERVICE ACADEMY
   2. OTS
   3. AFROTC
   4. DIRECT APPOINTMENT
   5. OTHER (PLEASE SPECIFY) _____

4. Which of the following best describes you (select one) ?

   1. I HAVE ALREADY PASSED THE E.I.T.
   2. I HAVE ALREADY PASSED SOME OR ALL OF THE SECTIONS OF THE A.R.E. BUT I AM NOT REGISTERED YET.
   3. I AM ALREADY A PROFESSIONAL ENGINEER OR A REGISTERED ARCHITECT.
   4. I HAVE NOT TAKEN OR PASSED EITHER THE E.I.T. OR ANY SECTIONS OF THE A.R.E.
   5. I DO NOT INTEND TO TAKE EITHER THE E.I.T. OR THE A.R.E. EXAM.

USAF Survey Control No. 87-46, expires 31 July 1987

5. Do you intend to become Professionally Registered ?

1. YES
2. NO
3. UNDECIDED
4. I AM ALREADY REGISTERED

SECTION II. PROFESSIONAL REGISTRATION

For each of the following questions, circle the one item which best applies to you (circle one). If you selected option 5 to question 4, please skip to question 11.

6. What study method do you plan to use in preparing for the E.I.T. or the A.R.E. exam ?

1. I HAVE ALREADY COMPLETED THE E.I.T. OR A.R.E. EXAM.
2. I DO NOT INTEND TO TAKE EITHER EXAM
3. SELF STUDY
4. STUDY GROUP
5. COLLEGE REFRESHER COURSE USING TUITION ASSISTANCE
6. VIDEO TAPES
7. STUDY GUIDES OR MANUALS
8. OTHER (PLEASE SPECIFY) _____

7. What study method do you plan to use in preparing for the P.E. exam.

1. I HAVE ALREADY COMPLETED THE P.E. EXAM
2. I DO NOT INTEND TO TAKE THE P.E. EXAM
3. SELF STUDY
4. STUDY GROUP
5. COLLEGE REFRESHER COURSE USING TUITION ASSISTANCE
6. VIDEO TAPES
7. STUDY GUIDES OR MANUALS
8. OTHER (PLEASE SPECIFY) _____

8. If the Air Force provided various study programs, which method would you find most beneficial?

1. I HAVE ALREADY COMPLETED THE E.I.T. OR A.R.E. EXAM
2. I DO NOT INTEND TO TAKE EITHER EXAM
3. SELF STUDY
4. SHORT COURSE AT AFIT
5. COLLEGE REFRESHER COURSE USING TUITION ASSISTANCE
6. PREFER TO STUDY BY MYSELF
7. STUDY GUIDES OR MANUALS
8. ARCHITECTURAL LICENSING SEMINAR
9. OTHER (PLEASE SPECIFY) _____

9. If you are NOT already Professionally Registered, what would be your primary reason for becoming Professionally Registered ?

1. I AM ALREADY REGISTERED
2. I DO NOT PLAN ON BECOMING REGISTERED
3. CREDIBILITY WITH ARCHITECT-ENGINEERING FIRMS
4. CREDIBILITY WITH PEERS
5. CAREER PROGRESSION
6. PERSONAL GOAL
7. OTHER (PLEASE SPECIFY) _____

_____

10. If you are already Professionally Registered, what was your primary reason for becoming Professionally Registered ?

1. I AM NOT REGISTERED
2. CREDIBILITY WITH ARCHITECT-ENGINEERING FIRMS
3. CREDIBILITY WITH PEERS
4. CAREER PROGRESSION
5. PERSONAL GOAL
6. OTHER (PLEASE SPECIFY) _____

_____

11. If you do not intend to become registered, what is your primary reason for NOT registering ?

1. AIR FORCE DOESN'T REQUIRE IT.
2. TAKES TOO MUCH TIME.
3. I'VE BEEN OUT OF SCHOOL TOO LONG TO PASS THE TEST.
4. I DON'T WANT TO.
5. I DO NOT THINK THE STATE REGISTRATION BOARD WILL ACCEPT MY EXPERIENCE.
6. OTHER (PLEASE SPECIFY) _____

_____

SECTION III. ATTITUDES AND PERCEPTIONS

For each of the following statements, indicate how each relates to your personal attitudes towards registration. DO NOT ANSWER AS TO HOW YOU THINK PROFESSIONAL REGISTRATION SHOULD BE IN THE AIR FORCE, BUT RATHER HOW YOU THINK PROFESSIONAL REGISTRATION IS ACTUALLY PERCEIVED IN THE AIR FORCE.

STRONGLY AGREE	AGREE	UNDECIDED	DISAGREE	STRONGLY DISAGREE
1	2	3	4	5

12. ___ AIR FORCE ENGINEERS NEED TO BE PROFESSIONALLY REGISTERED.

13. ___ PROFESSIONAL REGISTRATION WILL HELP ME IN MY CURRENT JOB.

14. ___ PROFESSIONAL REGISTRATION IS IMPORTANT FOR CAREER ADVANCEMENT IN THE AIR FORCE.

15. ___ PROFESSIONAL REGISTRATION IS MORE IMPORTANT FOR FEDERAL CIVILIAN ENGINEERS THAN FOR AIR FORCE CIVIL ENGINEERING OFFICERS.

16. ___ PROFESSIONAL REGISTRATION WILL HELP ME GET MY CHOICE OF ASSIGNMENT.

17. ___ AN ENGINEERING BONUS (SIMILAR TO BONUSES FOR DOCTORS, LAWYERS) FOR BEING REGISTERED WOULD MOTIVATE ME TO BECOME PROFESSIONALLY REGISTERED.

18. ___ PME IS MORE IMPORTANT FOR CAREER PROGRESSION THAN PROFESSIONAL REGISTRATION

19. ___ PROFESSIONAL REGISTRATION IS NOT IMPORTANT FOR AIR FORCE CIVIL ENGINEERING OFFICERS.

20. ___ PROFESSIONAL REGISTRATION IS ENCOURAGED IN THE MILITARY.

21. ___ PROFESSIONAL REGISTRATION IS MORE IMPORTANT FOR ARMY/NAVY ENGINEERING OFFICERS THAN IT IS FOR AIR FORCE CIVIL ENGINEERING OFFICERS.

STRONGLY AGREE	AGREE	UNDECIDED	DISAGREE	STRONGLY DISAGREE
1	2	3	4	5

22. ___ I WOULD BE MORE LIKELY TO PURSUE PROFESSIONAL REGISTRATION IF THE AIR FORCE OFFERED TUITION ASSISTANCE TO PAY FOR THE EXAM.

23. ___ I WOULD BE MORE LIKELY TO PURSUE PROFESSIONAL REGISTRATION IF THE AIR FORCE PROVIDED REVIEW/ STUDY/SEMINAR COURSES TO HELP ME PASS THE EXAM.

SECTION IV. COMMENTS

PLEASE FEEL FREE TO MAKE ANY ADDITIONAL COMMENTS ABOUT THIS SURVEY OR ABOUT PROFESSIONAL REGISTRATION.

PLEASE ENCLOSE THIS SURVEY AS WELL AS AFIT FORM 11C IN THE ATTACHED ENVELOPE. THANK YOU FOR TAKING THE TIME TO COMPLETE THIS SURVEY.

Appendix B: SPSS Computer Program

```
TITLE            'Statistics program for thesis'
FILE HANDLE      SURVEY/ NAME= 'wxyz'
DATA LIST        FILE= SURVEY FIXED RECORDS= 1/
                 ENGSPEC, GRADE, SOURCOM, EITPEARE, INTENTPE,
                 STUDYEIT, STUDYPE, STUDYPRO, NOTREG, REG,
                 NOINTENT, ENGNEDPE, CURJOB, CAREER, FEDCIV,
                 ASSIGN, ENGBONUS, PME, PRIMPORT, ENCOUR,
                 ARMYNAVY, TUITION, REVIEW,
                 (40X,23F1.0)
RECODE           ENGSPEC TO REVIEW (0=1) (1=2) (2=3) (3=4)
                 (4=5) (5=6) (6=7) (7=8) (8=9)
SET              BLANKS=0
MISSING VALUES   ENGSPEC TO REVIEW (0)/
SET              WIDTH = 100
FREQUENCIES      VARIABLES = ENGSPEC(1,) GRADE(1,5) SOURCOM(1,5)
                 EITPEARE(1,5) INTENTPE(1,4) STUDYEIT TO
                 STUDYPE(1,8) STUDYPRO(1,9) NOREG(1,7) REG(1,6)
                 NOINTENT(1,6) ENGNEDPE TO REVIEW(1,5)/
                 STATISTICS= DEFAULT/
comment          chi-square test for hypothesis 2
RECODE           GRADE (2=1)
VALUE LABELS     GRADE 1 'LT' 3 'CAPT' 4 'MAJ' 5 'LT COL'/
CROSSTABS        VARIABLES= GRADE(1,5) ENGNEDPE(1,5)/
                 TABLES = GRADE BY ENGNEDPE
OPTIONS          3 4 14
STATISTICS       1
comment          chi-square test for hypothesis 3
NPAR TESTS       CHISQUARE = NOTREG(3,7)/
NPAR TESTS       CHISQUARE = REG(2,6)/
comment          chi-square test for hypothesis 4
NPAR TESTS       CHISQUARE = NOINTENT/
comment          chi-square test for hypothesis 5
NPAR TESTS       CHISQUARE = STUDYEIT(3,8)/
NPAR TESTS       CHISQUARE = STUDYPE(3,8)/
NPAR TESTS       CHISQUARE = STUDYPRO(3,9)/
FINISH
```

Appendix C: Data

NO.	RESPONSE	NO.	RESPONSE
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3	03202 235 341230021400	50	0100202240213314101221 1
4	221010101053431400224 44	51	012000202 343142013222
5	341302275551331300213 11	52	0020006330540403000420 0
6	0211000330 021430343430	53	0210003343 000330340400
7	4213022550 334331014233	54	121324445133113111121 1
8	4023044350 012132132230	55	0120006350 130230032400
9	022302235043430400041 30	56	030010132 3223141021233
10	301306 750 133231131231	57	34141 3313033033210
11	3023061720 221131033211	58	0110006050 101231141311
12	102306433022331300012 11	59	4113222440 212110222220
13	022000654050133300433 44	60	031010144001431410132 31
14	0121000303 010110011200	61	332106173043333330131 11
15	302306775004341300141 10	62	1020002040 030431333311
16	522322234023411340113 30	63	34241 4123421012220
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23	1422300004 113141011211	70	012100 40 344241004233
24	121312161023411430134 31	71	1220004020 133331133311
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26	232230000150044400412 42	73	422411111002442430032 30
27	022311131023241310132 31	74	222000655053221310223 31
28	3221061750 414130044100	75	0210002450 133130013110
29	121322264 1321331231211	76	44141 2232133121311
30	02100 665 242131113231	77	421306432021331311313 11
31	122304435 232020023010	78	0210002050 132120133301
32	332230700451130410331 31	79	111000605041320210331 33
33	022324435003343400123 21	80	0110004420 112130021241
34	042020784 333141111333	81	00141 0344140003221
35	121322234023331321132 20	82	0120006404 044440402122
36	022120655043332311112 2	83	021000405 334041014111
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38	622323335053334410444 00	85	0120006620 111022132121
39	431020705051333321313 30	86	02141 3342133021342
40	0220002450 403143441334	87	021304435014440010314 00
41	0210005040 332121113230	88	0223044350 222120021131
42	5403244350 233120023210	89	1010006050 031121031231
43	12242 2344144013311	90	012302235053320313241 10
44	012020444053110311313 30	91	210326244053321311114 10
45	041000434012220100212 10	92	3023061720 011320241300
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NO.	RESPONSE	NO.	RESPONSE
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98	24241 3132043132233	149	0120006050 333131013211
99	0303066650 103331033322	150	042302435 332131031211
100	0003022240 111010031400	151	0110002240 012331132333
101	022327736053441411011231	152	022000665053341300312333
102	3122301001 444144004211	153	52232114202344142014211
103	111326535054443410010 30	154	221325635054441400011 30
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133	021020666054351400123 30	184	4123077460 231010031200
134	0123022 5 243440012220	185	14002044202233141121 3
135	421010161053432440132 33	186	312302 75 001 41241410
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137	64241 5434144013412	188	1013044350 004230043200
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140	022326634022311010111 31	191	42123 111010031112
141	3223041740 333131111231	192	3013261720512133023321 3
142	1220006330 012130343400	193	4113066450 343120011211
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NO.	RESPONSE	NO.	RESPONSE
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199	5210006343 113332131433	250	01241 2443144011444
200	6110002 550524240014211	251	3023061420500032114441l
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204	1113066650044424000200O	255	421324443023431200130 21
205	001306235 333140012200	256	2322300004 343130011222
206	224304634051120200212l0	257	43241 5331131022211
207	3023061750 003130011200	258	0322300004 114331013231
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212	321100 303 1133311333	263	0220006440 121130123211
213	022000445 124443004033	264	0223266640034231021211
214	0120006450 133131003011	265	6220005350 333330012321
215	0123266640 343031031221	266	2220002040 011440033211
216	0210002420 113310133310	267	421426633033431200212 32
217	13223 131041010222	268	0003242650 313041012220
218	0100005040 101010041010	269	52141 0444041013333
219	21232223605444142041313	270	0302300003 11301003131
220	3223027740 443141004423	271	2322300004 112330021200
221	1113211340533233012322l	272	44241 2344133001122
222	0203056320 333130043410	273	0210006350 112332133311
223	3113221740 314142004200	274	0200206350413113303213l
224	1322300004 233130022311	275	3211037750533323302132 2
225	62141 5441301041244	276	1323266320223313102211O
226	1213066340113123003121O	277	3221061750 334140003110
227	0223046350 332120022100	278	4213044350 123140133300
228	3322300004 312123013334	279	1220006340 131010131211
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230	0223066640 314041034210	281	4223256340 232120122300
231	2113022340 112231123432	282	421000644 334141014231
232	0322400004 333140013111	283	64241 0133133113233
233	012000325 132120032230	284	0223022340 232130122200
234	021000415053421400322 31	285	0413222250233313303331l
235	1223222640114414001331O	286	1210002340524414000422 2
236	63141 5010430130322	287	0110006560 433031013133
237	2300101810324313202122 2	288	0212300003 021313142322
238	2213066340 333130013210	289	0203056350 342030021330
239	1223055550 444040021100	290	62141 2343133111322
240	0212300001 3231300133	291	0210006640 333330033310
241	0210006020004424001412 2	292	2212300004224423101133 3
242	02223 2 121331132332	293	02123 333131113211
243	0003022350 113140133443	294	2010204360344244000240O
244	43241 2444244002311	295	2213066630 232131022231
245	4213446740211213103231O	296	0210002050 101010031311
246	2013222340 232120232211	297	2212300004523213112211l
247	0220002060 033121013230	298	0020006350 304042033133

NO.	RESPONSE	NO.	RESPONSE
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VITA

Captain Gerald L. Hromowyk was born 12 December 1957 in North Tonawanda, New York. He graduated from North Tonawanda Senior High School in North Tonawanda, New York, in 1975 and attended the State University of New York (SUNY), Niagara County Community College in Sanborn, New York. He received his Associate in Sciences (math-science emphasis) in May 1978. Upon graduation, he transferred to the SUNY, College of Environmental Science and Forestry in Syracuse, New York. He graduated in May 1980 with a dual degree in engineering. First he received a Bachelor of Sciences degree in Forest Engineering from the College of Environmental Science and Forestry and second, he received a Bachelor of Sciences degree in Engineering from Syracuse University. After graduation, he received his commission in the USAF through the Officer Training School in February 1981 at Lackland AFB, Texas. He was first assigned to MacDill AFB, Florida as the Wing Energy Conservation officer. In March 1983 he went TDY enroute to Squadron Officer School (SOS) at Maxwell AFB, Alabama, and after completing SOS he was assigned to RAF Bentwaters, UK. While there, he was the Civil Engineering Collocated Operating Base/Forward Operating Location officer. He entered the School of Systems and Logistics, Air Force Institute of Technology in May 1986.

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The purpose of this research was to determine why a small percentage of Air Force Civil Engineering officers are professionally registered. The study had three objectives: (1) determine the attitudes and perceptions of Air Force Civil Engineering officers towards professional registration, (2) determine what causes these perceptions, and (3) if negative, what can be done to change these perceptions.

The study was accomplished by an analysis on the results from a mailed questionnaire to Air Force Civil Engineering officers. The officers ranked from Second Lieutenant to Lieutenant Colonel and were in 55XX career field. The results show the officers did not perceive a need for registration or are undecided. This perception didn't vary with officer rank. Therefore, Air Force leadership needs to offer incentives or make registration mandatory if they want more engineers registered.

The primary reason for wanting to obtain registration was "personal goal". The respondents perceived no incentive nor encouragement to become registered. The primary reason for becoming registered was "the Air Force doesn't require it". Respondents believed registration had little effect on their career since many officers on promotion boards were unaware of the significance of professional registration. Recommendations include inserting a special block for registration in the officers promotion brief. And promotion boards should be briefed about the significance of registration.

The study method preferred in preparing for the Engineer Intern Exam, Principles and Practices of Engineering Exam, and Architectural Registration Exam was "to study alone" and use "study guides/manuals". In addition, the preferred Air Force provided study method was a short course offered by the Air Force Institute of Technology (AFIT), School of Civil Engineering and Services. The recommendation was for the Air Force to either provide a short course by AFIT or offer financial assistance for those seeking registration.

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